Space Weather Forecast

Issued on Monday 3 February 2025 at 12:26 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Solar winds easing. Further Moderate-class flares expected, slight chance of a Strong flare.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was Moderate over the last 24 hours with frequent Moderate-class flares, the largest peaking at 03/0358UTC from the largest and most complex region in the northeast.

There are now up to eight active regions on the Earth-facing disc. The majority of the activity is from the broad cluster of sunspots which are beginning to cross the central disc from the northeast quadrant, consisting of five bipolar groups. These form a complex area of multiple active regions, with signs of magnetic interaction between the regions suggesting the ongoing potential for notable flares. The eastern-most of these regions continues to exhibit sustained growth, especially in the intermediate and trailer portions, with at least two complex magnetic configurations evident. The remaining spot groups are small and magnetically simple, with either limited evolution or slow decay.

A Moderate-class flare from the most complex sunspot in the northeast at 02/2324 UTC was followed by a faint CME (coronal mass ejection) from the southeast in imagery. Analysis is ongoing to determine whether an Earth-directed component is likely. No other Earth directed CMEs were observed in available imagery.

Solar Wind / Geomagnetic Activity: Solar winds showed a declining connection to a fast solar wind stream. Wind speeds were initially strong around 600 km/s, falling to around 450 km/s. The Interplanetary Magnetic Field was initially weak but increased to moderate levels after 02/1600 UTC. The north-south component was initially weakly variable before becoming predominantly moderately positive. Geomagnetic activity was Unsettled to Active (Kp 3-4) at first before decreasing to Quiet (Kp 0-2), after 02/2100UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) persisted at background levels with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally Moderate activity is expected, with Moderate flares expected at times and a slight chance of isolated Strong flares, primarily from the regions on the northeast disc.

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Solar Wind / Geomagnetic Activity: There is one CME in the forecast which could give a glance early on Day 1 (03 Feb), however this is later than initially forecast and may well have missed Earth already, or perhaps passed as a weak feature.

Earth is still connected to a coronal hole, but with wind speeds continuing to decline, currently at slightly elevated levels. Solar winds are expected to continue easing during Days 1-2 (03-04 Feb), returning to generally slightly elevated or background levels by Day 3-4 (05-06 Feb).

Generally Quiet to Unsettled (Kp 1-3) geomagnetic activity is expected as Earth continues to come out of the coronal hole high speed stream, with a chance of Active (Kp 4) intervals on Day 1 (03 Feb). A decreasing slight chance of G1/Minor Storm (Kp 5) intervals remains if any CME glance is observed early on Day 1. Activity then expected to ease further from Day 2 (04 Feb) onwards, becoming generally Quiet (Kp 1-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is likely to remain at background levels. However, there is a slightly increasing risk of a rise through this period, as the complex of sunspots in the northeast disc move into the western hemisphere.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	15	5	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	80	80	80	80
Very Active	R3-R5 (X Class)	No	20	20	20	20

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	15	20	20	25
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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